electrically connected so that in response to an electrical current flowing therethrough each winding produces a magnetic field having the same polarity.

Please insert the following new claims:

21. (New) A linear motor comprising a linear armature having a plurality of layers, each layer having at least one electrically conductive winding formed thereon, with at least two of said layers separated from each in spaced parallel relation.

22. (New) The linear motor of claim 21, further including spacing means positioned between said at least two layers for maintaining said at least two layers in spaced parallel relation.

REMARKS

In this Amendment, claims 1, 7, 11 and 18 have been amended and new claims 21 and 22 have been added to claim the invention to the extent the Applicants are entitled. Claims 1-22 are pending in the application.

Claims 1-20 stand rejected under 35 U.S.C. §103(a) for obviousness from the teachings of United States Patent No. 4,767,954 to Phillips in view of United States Patent No. 4,962,329 to Fujita et al.

In the Office Action, the Examiner admits that the Phillips patent does not teach certain features of the present invention. However, the Examiner asserts that the disclosure of the Fujita et al. patent teaches and suggests the features of the present invention not disclosed in the Phillips patent. Reconsideration is requested.

The Fujita et al. patent discloses a "thin pliable single insulating base material 12" (Fujita et al. patent column 4, lines 18 and 19), having six sets of unit coil groups 16 formed on a front side of insulating base material 12 and a like number of sets of unit coil groups formed on the back side of insulating base material 12 in registration with the unit coil groups on the front side of insulating base material 12. The coils of each unit coil group in registration on opposite sides of insulating base material 12 are connected in series so that the same current flows through coils 14_1 -14_8 and 18_1-18_8.

In use, the single insulating base material 12 and unit coil groups 16 are wound into a cylindrical shape with at least one section of single insulating base material 12 and unit coil

groups 16 overlapping another such section. The overlapping portions of single insulating base material 12 and unit coil groups 16 are laminated together.

The Fujita et al. patent, does not disclose, teach or suggest that each pair of adjacent conductive windings of each layer are electrically isolated from each other on the layer. Rather, the Fujita et al. patent discloses that numerous pairs of adjacent conductive coils are connected in series. Moreover, the Fujita et al. patent does not disclose, teach or suggest a plurality of electrically nonconductive layers laminated together. Rather, as discussed above, the Fujita et al. patent has a single insulating base material 12 that is wound into a cylindrical shape and laminated on itself. Moreover, the teachings of the Fujita et al. patent to wind single insulating base material 12 into a cylindrical shape and laminate single insulating base material 12 on itself is not applicable to the linear armature of the present invention having a plurality of electrically nonconductive layers laminated together. Specifically, folding a single substrate into layers to create the linear armature of a linear motor would necessarily cause the substrate to form a radius at one or both the ends of the linear armature. This radius would increase the width of such linear armature whereupon a wider gap would be required between the poles of the magnet assembly in order to accommodate the movement of such linear armature therebetween. The combination of the wider gap between the poles of the magnet assembly and the increased radius at the ends of such linear armature would result in an increased spacing between the poles of the magnet assembly and the coils on the nonconductive substrate. However, this is contrary to conventional motor design wherein it is typically desirable to minimize the spacing between the poles of the magnet assembly and the coils of the armature. Moreover, folding the nonconductive substrate of the Fujita et al. patent into layers to form a linear armature would result in undue stress on any conductive materials formed on the insulating substrate at the ends of the armature where the substrate forms the radius. Specifically, folding a single substrate in a manner to overlay one portion on another portion to form a linear armature would undesirably stretch any electrically conductive material at the end(s) of the linear armature where the substrate forms a radius whereupon this conductive material may be subject to breaking when the armature is formed or over time in response to the heating and cooling cycles that the armature would experience in use. The Phillips patent does not cure these deficiencies in the teachings of the Fujita et al. patent.

Absent disclosing, teaching or suggesting an invention all features of claims 1, 11 and 18, the Phillips and Fujita et al. patents, either or singly or in combination, cannot render

obvious these claims, or claims 2-10, 12-17 and 19-20 dependent therefrom.

Claims 7 and 16, and new claim 21 recite, among other things, that two or more adjacent electrically nonconductive layers are positioned in spaced parallel relation. Moreover, claims 7 and 16, and new claim 22, recite that spacers or spacing means are utilized to maintain the two or more adjacent nonconductive layers in spaced parallel relation. The Phillips and Fujita et al. patents, either singly or in combination, do not disclose, teach or suggest these features of claims 7, 16 and 22.

CONCLUSION

Based on the foregoing amendments and remarks, reconsideration of the rejection and allowance of claims 1-22 are requested.

Respectfully submitted,

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MARKED-UP VERSION OF CHANGES MADE

IN THE CLAIMS:

Amend claims 1, 7, 11 and 18 as follows:

1. (Amended) A linear motor comprising:

a magnet track;

a magnet assembly coupled to the magnet track, the magnet assembly having a plurality of side-by-side alternating magnetic north poles and magnetic south poles; and

[an] a linear armature having a plurality of side-by-side electrically conductive coils formed on an electrically and magnetically nonconductive substrate which is movably coupled to the magnet track such that the side-by-side electrically conductive coils are positioned and movable in spaced parallel relation to the side-by-side alternating magnetic poles, the substrate including a plurality of electrically nonconductive layers laminated together, each layer having a plurality of electrically conductive windings formed thereon in side-by-side relation on at least one surface thereof with each pair of adjacent conductive windings of each layer electrically isolated from each other on the layer, each electrically conductive winding of each layer positioned in registration and electrically connected with a corresponding electrically conductive winding on each other layer to form one of the electrically conductive coils.

7. (Amended) The linear motor as set forth in claim 1, further including a plurality of spacers positioned between two or more adjacent [layer] layers for maintaining the two or more adjacent layers in spaced parallel relation with a gap therebetween.

11. (Amended) A linear motor comprising a linear armature having a plurality of layers, each layer having a plurality of electrically conductive windings formed thereon in side-by-side relation on one surface thereof, the plurality of layers laminated together with the plurality of electrically conductive windings of each layer positioned in registration, wherein each electrically conductive winding on each layer is electrically connected with corresponding electrically conductive windings positioned in registration therewith on the other

layers and with each pair of adjacent electrically conductive windings on each layer [are] electrically isolated from each other on the layer.

18. (Amended) A motor comprising [an] a linear armature having a plurality of side-by-side electrically conductive coils formed on an electrically and magnetically nonconductive substrate with each pair of adjacent coils electrically isolated from each other, each coil including a plurality of electrically conductive windings positioned coaxially and electrically connected so that in response to an electrical current flowing therethrough each winding produces a magnetic field having the same polarity.